

## **POOR LEGIBILITY**

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August 21, 1975

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Attorneys at Law  
One Manchester Avenue #600  
Inglewood, California 90301

Re: Western Refuse Hauling, Inc. - Appeal  
City of Carson

Attention: Mr. Donald G. Cadon

Gentlemen:

This is a letter report to you on an evaluation by the undersigned of the report entitled "Design Report for Gas Control Facilities, Proposed Southbay Drive-In Theatre, Carson, California." The report was prepared for Syffy Enterprises by S.C.S. Engineering Inc., 4014 Long Beach Blvd., Long Beach, California 90807. I am familiar with the subject site bounded on the west by the Los Angeles Department of Water and Power easement along Figueroa Street and on the east by Main Street, on the north by Francisco Street, and on the south by another Los Angeles Department of Water and Power easement paralleling Del Amo Blvd.; I visited the property during filling operations and have been at the site as recently as a few months ago. In conformance with the engineer's code of ethics, I contacted a representative of S.C.S. Engineering by telephone and indicated the nature of my interest and asked if there were any objections to my making a critical review of their report; I was assured that there would be no question about the propriety of my making such a review.

First, I will make general observations about the uses of sanitary landfills after completion and then I will address the subject proposed property use. In my more than 25 years of experience and study of sanitary landfilling, I have been consistently opposed to uses that could, under certain circumstances, lead to the accumulation of flammable and explosive gases in sufficient concentrations to endanger public health and safety. To achieve this as a goal, I determined upon a program for the Los Angeles County Sanitation Districts, commencing in 1950, that has led to the safe utilization by the public of completed portions of landfills for either park purposes, such as playgrounds or baseball fields, or in one case as a botanical garden. In these instances, structures for occupancy were not to be built upon completed portions of the fill, but were built upon peripheral undisturbed soil and with suitable placement of plastic membranes to prevent the possible encroachment of gas through the soil into those buildings. Such buildings at parks or botanical gardens have not been the principal point of concentration for visitors, but rather the grounds themselves which are large areas of turfed surface through which gases of decomposition migrate

uniformly, but slowly, into the atmosphere. It has been my consistent belief that the placement of structures upon landfills cannot be suitably performed without the threat of consequences unless gas migration possibilities into such buildings are prevented by virtually fail-safe procedures.

To make as foolproof as possible the construction of gas confining structures and paving atop sanitary landfills requires two systems. The first provides an active vacuum system that pumps at all times to create negative pressures sufficient to cause explosive and obnoxious gases to flow away from points of possible flame or explosion towards vent piping that carries those gases to some point for safe disposal or possible recovery. Such active systems depend upon mechanical devices such as electric motors, vacuum pumps, switches, automatic circuitry, electrical lines and a source of electricity. All of these elements are vulnerable to potential damage or failure and such active systems cannot be considered in and of themselves as foolproof devices. To insure further against possible fire or explosion during periods of failure of the active system, a "passive" system comprising membranes, gas barriers, gas seals, and other such physical interference with the free movement of gases is added to create a "nearly" fail-safe situation.

There are still two major defects in such active and passive gas control systems: 1, the potential of possible rupture, unseen, and possibly resulting from aging of gas-tight membranes and barriers. This might occur coincident with a failure of the active gas removal system; and 2, the cost. Costs for installing such two-fold gas control systems are obviously much greater than to install one or the other but the redundancy increases factors of safety many fold. For the proposed drive-in development, it is possible, maybe even probable, that the requirement for such redundancy over the entire surface of the developed 22 acres would prove to be uneconomical, because of high initial capital costs for installation and continuing costs for purchasing electrical energy and providing necessary monitoring. The writer has observed circumstances in which uneven settling of landfills--an almost universal characteristic--has resulted in the opening of cracks or fissures in paved areas. These cracks or fissures provide for release of confined gases at concentrations sufficient to be readily detectable by smell and, in often too many instances, by flame when exposed to a match or other lighting device. It seems that a likelihood exists that an unthinking car occupant might throw a lighted match or lighted cigarette stub onto the paving surface where a possible fire might result; at the same time, it does not appear likely that an explosion would result from such cracks or fissures venting concentrated quantities of gases in the near vicinity of automobiles, because of the natural dilutions that would occur in, around, and under passenger vehicles. Unfortunately, however, a flame of even several inches height could catch tires or greasy surfaces on fire, perhaps unnoticed by the car's occupants or by nearby car occupants, particularly with the concentration of attention being focused on the motion picture screen. Such fire could quickly build to a point where containment might be extremely difficult; the occupants of the car might become endangered, particularly where infants or small children might be involved. Dripping gasoline tanks and filler pipes and the possible flaming or explosion of those tanks must be given some thought.

An open use for a site as small as 20-25 acres for park purposes, including pitch-and-putt miniature golfing and other "open" uses would not be nearly as hazardous because of a mobility of the people in the open and their ready ability to move away from such a fire if such a flame occurred.

### The Specific Site

The writer finds no argument with the report descriptions of the property or of the manner in which it has been filled. The descriptions of in-situ gas control wells and manifolding and pumps appears to be accurate and the systems described to prevent outward migration of objectional gases through the soils into adjoining properties would, in the opinion of the writer, be adequate and safe.

A factor that must be given serious consideration is the permitting of extraneous water into the sanitary landfill. This could arise from over-watering of plantings such as grasses, shrubs and trees, as well as from the percolation of ponded water. Areas in the landfill that would become more moist than surrounding areas would decompose more rapidly and, therefore, settle more rapidly than the surrounding area causing subsidence or settlement cracks in the asphalt paving. All areas to be watered should be controlled through automatic systems with ground probes that sense the depth of penetration of water to the root zone and shut off the watering system to prevent over irrigation.

The proposed 1,350 gas vents, one foot by two foot in section and penetrating the asphaltic pavement are but .3 percent of the total developed surface area. Assuming the depth figures to be correct as presented in the SCS report, each such two square feet of gravel vent must service 370 tons-- almost 3/4 million pounds of solid wastes in the landfill below. To have some measure of size of what such a volume of material that would represent, the following are presented:

1. The 370 tons represents about 60 to 70 truck loads of compacted refuse in modern collection vehicles;
2. Each contributory portion of landfill to a vent would represent a "cell" of decomposing refuse approximately 19 feet by 38 feet in cross-section and some 30 feet in depth.

It appears to the writer that the proposed system for allowing lighter-than-air gases, such as methane, to escape to the atmosphere through constructed vents would tend to concentrate those gases, so that the concentration of methane at the release point to the atmosphere might prove to be flammable. Since there is a wealth of information that indicates that open landfilled space, such as golf courses and parks, where 100 percent of the surface is used for venting, have proved to be safe, perhaps at least ten percent of the surface area should be provided for gas venting rather than the present design of .3 percent.

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3. The City of Carson will provide Developer with weekly statements of the work

It appears to be very important that the vents do not penetrate through the earth cover, since the earth itself acts as a bacterial laden filter to oxidize odorous gases to an innocuous condition. Such bacterial vents do not function properly unless kept moist for bacterial growth; it is difficult to see how this could be done with some 1,350 venting areas. It may be that water vapor released from decomposing refuse will keep the earth moist, but this should be determined in advance or some means provided for moistening the soil artificially if such a mechanism did not function.

Some concern is felt by the writer concerning the system for venting gases from the soil under and around the refreshment stand; the system described appeared to depend upon the lighter-than-air gases, carrying some very objectionable odorous gases, rising through vertical pipes to be discharged through normal convection above the roof level. This system might function under normal conditions without causing odors, however, during periods of ground radiation loss to the atmosphere, the layer close to the ground might become quite heavy and stagnant and the gases discharged to it would not be wafted away on the night air. In such cases, the odors created around the snack stand could be self defeating in that they would tend to reduce or eliminate any interest in eating and drinking.

#### Summary

The proposed use of the completed landfill does not, in the writer's opinion, conform with the safe standards that have been established for uses of sanitary landfills. Parking many automobiles on a completed landfill that has been paved and the gases confined to limited areas for venting or possibly released through settlement cracks or fissures, exposes the car occupants to potential fires that could result from excessively hot exhaust pipes and mufflers, catalytic converters, hot exhausts or backfires, or accidentally or intentionally discarded lighted matches or cigarettes. Open development into turfed areas has proved to be a safe and compatible use for the surface overlying an actively decomposing landfill.

If the projected use is to cause concentrations of humans in enclosed vehicles atop a landfill, it appears judicious to require both active and passive control systems such as described in the body of this letter report.

Sincerely,

*Frank R. Bowerman*

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State of California

CDM Inc., ENVIRONMENTAL ENGINEERS  
President

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